





## CONTENTS

### No. 1. MARCH 1960

	PAGE
SLEIGH, M. A. The form of beat in cilia of <i>Stentor</i> and <i>Opalina</i> . (With Plate 1)	1
HUGHES, G. M. The mechanism of gill ventilation in the dogfish and skate	11
HUGHES, G. M. A comparative study of gill ventilation in marine teleosts	28
WILSON, DONALD MELVIN. Nervous control of movement in annelids	46
WILSON, DONALD MELVIN. Nervous control of movement in cephalopods	57
KITCHING, J. A. and PADFIELD, J. E. The physiology of contractile vacuoles. XI. Effects of heavy water on the water balance of a suctorian	73
BRYAN, G. W. Sodium regulation in the crayfish <i>Astacus fluviatilis</i> . I. The normal animal	83
BRYAN, G. W. Sodium regulation in the crayfish <i>Astacus fluviatilis</i> . II. Experiments with sodium-depleted animals	100
BRYAN, G. W. Sodium regulation in the crayfish <i>Astacus fluviatilis</i> . III. Experiments with NaCl-loaded animals	113
BAINBRIDGE, RICHARD. Speed and stamina in three fish	129
HARKER, JANET E. The effect of perturbations in the environmental cycle of the diurnal rhythm of activity of <i>Periplaneta americana</i> L.	154
HARKER, JANET E. Internal factors controlling the suboesophageal ganglion neurosecretory cycle in <i>Periplaneta americana</i> L.	164
CHURCH, NORMAN STANLEY. Heat loss and the body temperatures of flying insects. I. Heat loss by evaporation of water from the body. (With Plate 2)	171
CHURCH, NORMAN STANLEY. Heat loss and the body temperatures of flying insects. II. Heat conduction within the body and its loss by radiation and convection. (With Plate 3)	186

### No. 2. JUNE 1960

BROWNING, T. O. and FORREST, W. W. The permeability of the shell of the egg of <i>Acheta commodus</i> Walker (orthoptera, gryllidae)	213
HUGHES, R. D. Induction of diapause in <i>Erioischia brassicae</i> Bouché (dipt., anthomyiidae)	218
MILLER, P. L. Respiration in the desert locust. I. The control of ventilation	224
MILLER, P. L. Respiration in the desert locust. II. The control of the spiracles	237
MILLER, P. L. Respiration in the desert locust. III. Ventilation and the spiracles during flight	264

	PAGE
KATSUKI, YASUJI and SUGA, NOBUO. Neural mechanisms of hearing in insects . . . . .	279
HUGHES, G. M. and WIERSMA, C. A. G. Neuronal pathways and synaptic connexions in the abdominal cord of the crayfish . . . . .	291
GEORGE, J. C. and BHAKTHAN, N. M. G. A study on the fibre diameter and certain enzyme concentrations in the flight muscles of some butterflies. (With Plates 4 and 5) . . . . .	308
LOCKEY, KENNETH H. The thickness of some insect epicuticular wax layers . . . . .	316
PENNYCUICK, C. J. Gliding flight of the fulmar petrel . . . . .	330
CROGHAN, P. C. and LOCKWOOD, A. P. M. The composition of the haemolymph of the larva of <i>Drosophila melanogaster</i> . . . . .	339
PARRY, GWYNETH and HOLLIDAY, F. G. T. An experimental analysis of the function of the pseudobranch in teleosts . . . . .	344
EMMONS, PATRICIA and McLENNAN, H. Some observations on tick paralysis in marmots . . . . .	355
MILLOTT, N. and YOSHIDA, M. The shadow reaction of <i>Diadema antillarum</i> Philippi. I. The spine response and its relation to the stimulus . . . . .	363
MILLOTT, N. and YOSHIDA, M. The shadow reaction of <i>Diadema antillarum</i> Philippi. II. Inhibition by light . . . . .	376
YOSHIDA, M. and MILLOTT, N. The shadow reaction of <i>Diadema antillarum</i> Philippi. III. Re-examination of the spectral sensitivity . . . . .	390
LOCKE, M. The cuticular pattern in an insect—the intersegmental membranes. (With Plate 6) . . . . .	398
KITCHING, J. A. Responses of the heliozoon <i>Actinophrys sol</i> to prey, to mechanical stimulation, and to solutions of proteins and certain other substances. (With Plate 7) . . . . .	407
MURRAY, R. W. The response of the ampullae of Lorenzini of elasmobranchs to mechanical stimulation . . . . .	417
PARRY, GWYNETH. The development of salinity tolerance in the salmon, <i>Salmo salar</i> (L.) and some related species . . . . .	425

No. 3. SEPTEMBER 1960

NICHOLAS, W. L., DOUGHERTY, ELLSWORTH C., HANSEN, EDER LINDSAY, HOLM-HANSEN, OSMUND and MOSES, VIVIAN. The incorporation of $^{14}\text{C}$ from sodium acetate-2- $^{14}\text{C}$ into the amino acids of the soil-inhabiting nematode, <i>Caenorhabditis briggsae</i> . (With Plate 8) . . . . .	435
MILBURN, T. R. and BEADLE, L. C. The determination of total carbon dioxide in water . . . . .	444
YONEDA, MITSUKI. Force exerted by a single cilium of <i>Mytilus edulis</i> . I. (With Plate 9) . . . . .	461

	PAGE
HOL, RAGNAR and JOHANSEN, KJELL. A cineradiographic study of the central circulation in the hagfish, <i>Myxine glutinosa</i> L. (With Plate 10) . . . . .	469
JOHANSEN, KJELL and HOL, RAGNAR. A cineradiographic study of respiration in <i>Myxine glutinosa</i> L. (With Plates 11 and 12) . . . . .	474
NAYLOR, E. Locomotory rhythms in <i>Carcinus maenas</i> (L.) from non-tidal conditions	481
WELLS, M. J. Proprioception and visual discrimination of orientation in <i>Octopus</i>	489
WIGGLESWORTH, V. B. The nutrition of the central nervous system in the cockroach <i>Periplaneta americana</i> L. The role of perineurium and glial cells in the mobilization of reserves. (With Plate 13) . . . . .	500
TREHERNE, J. E. The nutrition of the central nervous system in the cockroach, <i>Periplaneta americana</i> L. The exchange and metabolism of sugars . . . . .	513
SHAW, J. The absorption of sodium ions by the crayfish, <i>Astacus pallipes</i> Lereboullet. II. The effect of the external anion . . . . .	534
SHAW, J. The absorption of sodium ions by the crayfish, <i>Astacus pallipes</i> Lereboullet. III. The effect of other cations in the external solution . . . . .	548
SHAW, J. The absorption of chloride ions by the crayfish, <i>Astacus pallipes</i> Lereboullet	557
PENNYCUICK, C. J. The physical basis of astro-navigation in birds; theoretical considerations . . . . .	573
STOBART, R. H. Studies on the exchange and regulation of sodium in the larva of <i>Aedes aegypti</i> (L.). II. The net transport and the fluxes associated with it . . . . .	594
TEN CATE, J. Locomotor movements in the spinal pigeon. (With Plate 14) . . . . .	609
LOCKWOOD, A. P. M. Some effects of temperature and concentration of the medium on the ionic regulation of the isopod <i>Asellus aquaticus</i> (L.) . . . . .	614
NEVILLE, A. C. Aspects of flight mechanics in anisopterous dragonflies . . . . .	631

No. 4. DECEMBER 1960

HUGHES, G. M. and WIERSMA, C. A. G. The co-ordination of swimmeret movements in the crayfish, <i>Procambarus clarkii</i> (Girard). (With Plates 1 and 2) . . . . .	657
HOYLE, G. Neuromuscular activity in the swimming sea anemone, <i>Stomphia coccinea</i> (Müller) . . . . .	671
BURSELL, E. Loss of water by excretion and defaecation in the tsetse fly . . . . .	689
WITTENBERG, JONATHAN B. The source of carbon monoxide in the float of the Portuguese man-of-war, <i>Physalia Physalis</i> L. . . . .	698
EDWARDS, R. W. and LEARNER, M. A. Some factors affecting the oxygen consumption of <i>Asellus</i> . . . . .	706
SATCHELL, G. H. The reflex co-ordination of the heart beat with respiration in the dogfish . . . . .	719

	PAGE
Ross, D. M. The effects of ions and drugs on neuromuscular preparations of sea anemones. I. On preparations of the column of <i>Calliactis</i> and <i>Metridium</i> . . . . .	732
Ross, D. M. The effects of ions and drugs on neuromuscular preparations of sea anemones. II. On sphincter preparations of <i>Calliactis</i> and <i>Metridium</i> . . . . .	753
NEEDHAM, A. E. The arginase activity of the tissues of the earthworms <i>Lumbricus terrestris</i> L., and <i>Eisenia foetida</i> (Savigny) . . . . .	775
RYLAND, J. S. Experiments on the influence of light on the behaviour of polyzoan larvae . . . . .	783
MACHIN, K. E. and LISSMANN, H. W. The mode of operation of the electric receptors in <i>Gymnarchus niloticus</i> . . . . .	801
EWER, D. W. Inhibition and rhythmic activity of the circular muscles of <i>Calliactis parasitica</i> (Couch) . . . . .	812
FIELDEN, ANN. Transmission through the last abdominal ganglion of the dragonfly nymph, <i>Anax imperator</i> . . . . .	832
HUBBARD, S. J. Hearing and the octopus statocyst . . . . .	845
GOODMAN, LESLEY J. The landing responses of insects. I. The landing response of the fly, <i>Lucilia sericata</i> , and other calliphorinae . . . . .	854
ROBERTSON, JAMES D. Studies on the chemical composition of muscle tissue. I. The muscles of the hagfish <i>Myxine glutinosa</i> L. and the roman eel <i>Muraena helena</i> L. . . . .	879
WEIS-FOGH, TORKEL. A rubber-like protein in insect cuticle . . . . .	889